

REMARKS

Attached hereto is a request for an Extension of Time and the appropriate fee.

The present invention discloses an improvement in an AC plasma display panel (PDP) which increases the luminous efficiency and is of particular value in large plasma display panels.

Generally plasma display panels can be broken into two separate types. A direct current (DC) and an alternating current (AC) PDP. Discharge cells in an AC Plasma Display Panel are fundamentally only capable of two display states, ON and OFF. As shown in Figure 3 of our present application, a frame in accordance with the National Television System Committee (NTSC) repeats itself at sixty frames per second. The frame is further subdivided into eight sub-frames and the ratio of the discharge sustain periods provide an eight bit binary combination to permit the expression of 256-level grey scale.

Of particular interest in our present invention is the discharge sustain period graphically shown for one sub-frame in Figure 4. As noted on Page 15, lines 5-12, sustain pulses are applied across the scan electrodes 19a and the sustain electrodes 19b with alternating polarity thereby causing a discharge to occur in the discharge cells when a wall charge has accumulated and light is to be admitted for a predetermined period. The actual sustain pulse is not a simple rectangular wave form but has a particular wave form addressed by the features of the present invention. As a result in an AC PDP reactive currents are more effectively suppressed when compared with a case where a sustained pulse of a conventional wave form is applied to thereby improve luminous efficiency.

The wave form of the sustained pulse is determined so that a current wave form which completes a fall by the time triple a rise time to a peak elapses from when the peak is reached is formed when the sustained pulse is applied. This particular current wave form is formed as

described in Page 22, line 5 through Page 25, line 15 of our present specification. The advantageous aspects of this invention has also been confirmed by the experimental results shown, for example, in Figures 9 and 10 and discussed on Page 25, line 18 through Page 27 line 9. Thus, in summary our present invention is directed to an AC plasma display panel which discloses an improvement in the discharged sustained period through the creation of a unique formation of a wave form for the sustained pulse which can be formed by any of the following features;

1. Applying a pulse of opposite polarity briefly before the leading edge of the sustained pulse.
2. Setting the absolute voltage of the sustained pulse higher during a fixed period after the leading edge of the sustained pulse, then during a period following the fixed period.
3. Applying a pulse of opposite polarity immediately after the trailing edge of the sustained pulse.

Since it's been recognized that in the examining procedure in the United States Patent Office an Examiner is encouraged to take the broadest possible interpretation of a claim and that the present invention relies upon technology directed to an AC gas discharge panel, Applicant has clarified certain claims in the present application simply to identify that the present invention relates to an AC type of gas discharge panel. Applicant is not aware of any teaching of an AC type panel that recognizes and addresses the solutions set forth in our present claims.

Applicant also wishes to thank the Examiner for the courtesy of a telephone conference on June 13, 2003, wherein the Examiner explained that in fact he was rejecting claims 1-34 as being completely anticipated by the *Miyazaki et al.* U.S. Patent No. 5,909,199. Thus in accordance with the Examiner's comments, the erroneous recitation of the *Suzuki et al.* U.S.

Patent No. 6,262,699 on Page 2 of the Office Action will be disregarded and Applicants will hereby respond on the assumption that the *Miyazaki et al.* reference is relied upon for anticipating every claim element in each of the outstanding claims.

The *Miyazaki et al.* reference is directed to technology in 1994 for addressing, in a DC plasma display panel, a problem associated with surge current that can deteriorate the performance of the plasma cells. As noted on Column 1, line 38 through 42, the service life of a plasma cell was inversely proportional to the square or cube of the discharge current. The *Miyazaki et al.* reference employed a constant current source that was connected and common to each of the complimentary switches corresponding to the individual plasma channels. A scanner sequentially turned on and off the switches to control the distribution of the discharge current sequentially to the corresponding plasma cells. As shown in Figure 2 *Miyazaki et al.* recognized the problem of a rush current and arranged the complimentary switches in series as a P type transistor and an N type transistor with the middle node connecting an output terminal to a cathode. The constant current source was connected to the common source electrodes of the N type transistors for each complimentary switch. A gate driver was connected to the gate electrode of each P type transistor and the on off actions of the complimentary switches was sequentially controlled by a scanner via the gate drivers.

To address the generation of a rush current that could occur when a charge was stored in an output capacity between the sources and the drains of the plurality of N type transistors in the off state, a diode element is inserted in the output stage of each complimentary switch. Thus, as shown in Figure 1, the diode element 9 was inserted in the drain side (output stage) of an N type transistor. In a second embodiment, a resistor element 10, as shown in Figure 6, was further added to the circuit for suppressing the rush current.

Needless to say, this reference does not recognize nor teach a particular generation of a pulse wave form in a discharge sustain period in an AC plasma display panel. Applicant accordingly traverses the unsupported statement on Page 3 that *Miyazaki et al.* teaches pulse wave forms wherein the current wave form is a wave form in which a time from which a peak is reached to when a fall is completed is no more than triple a time from when a rise is started to when the peak is reached, with references to Figures 3a, 3b, 4a, 4b, and 5a through 5d.

Figures 3a and 3b are actually directed to a conventional DC plasma display panel to disclose that the anode current, although ideally of a square wave form, can be subject to an undesirable rush current in the raise time. Figures 4a and 4b are likewise additional measurements of anode current and plasma luminous intensities, again without applying the solution of a particular diode between the switches.

Finally, Figures 5a through 5d show the effects of the diode element solution on both surge current and luminosity.

The cited Figures actually are supportive of the large surge (rush current) that can occur in the initial stage of a pulse and can cause noise in a DC type gas discharge panel. Thus, these Figures 3 and 4 relied upon by the Examiner are simply directed to a typical property of a sustained pulse in a DC gas discharge panel while Figures 5a through 5d are representative of the technique of using a diode suppression to address this initial rush current.

The manner in which a sustained pulse is applied in our AC gas discharge panel over that of the DC gas discharge panel is fundamentally different. As noted in our present disclosure, a driving circuit successively applies a plurality of sustained pulses which alternate in polarity as can be seen in Figure 4 of our disclosure. These features are also set forth in our claims and are clearly not taught nor suggested in the *Miyazaki et al.* disclosure. For example, reviewing an

anode current wave form shown in Figures 3a, 4a, 4b, 5a and 5b of the *Miyazaki* teaching suggest that the time period from when a peak is reached to when a fall is completed is more than triple a time period from when a rise is started to when the peak is reached. As shown, for example, in Column 4, line 44, Figure 3a, the measurement from the oscillogram is scaled so that one graduation of the time line abscissa indicates 5 μ s. Thus, using the time line it is apparent that the parameters of our claims are not taught. Additionally, as also noted on Column 4, lines 45 through 46, the theoretical "ideal" is that the anode current should be square in wave form.

Thus, *Miyazaki et al.* reference not only does not teach the current wave form as clearly set forth in our claims, but would further appear to teach away from it since the "ideal wave form" should be a square wave form. Thus, the *Miyazaki et al.* not only is not addressing the issues of an AC gas discharge panel, but further is attempting to address a surge current to try and more closely approximate an ideal square wave form.

As noted in the case of *Hughes Aircraft Company v. United States*, 215 U.S.P.Q. 787,804 (Ct.Cl. Trial Div. 1982)

[I]t is generally settled that the change in prior art device which makes the device inoperable for its intended purpose cannot be considered to be an obvious change.

Since the cited reference states that the ideal form of the applied anode current is a square wave form, our present invention would teach directly away from that since it is seeking to address a problem in a fundamentally different environment of an AC gas discharge panel.

As can be seen in our Figure 8a and 8b our application of pulses of opposite polarity is an attempt to ionize the gas particles not to suppress a rush current in the manner suggested for a DC gas discharge panel taught in the *Miyazaki et al.* reference.

In view of the amendment to the claims, it is believed the present case in condition for allowance, and an early notification of the same is requested. If the Examiner believes that a telephone interview will help further the prosecution of this case, he is respectfully requested to contact the undersigned attorney at the listed telephone number.

I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail in an envelope addressed to the Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on September 22, 2003.

By: James Lee




Signature

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Very truly yours,

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